

WE CLAIM:

1. A method of improving the surface properties of cast aluminum alloys comprising the steps of:

- a. providing a molten aluminum alloy that is essentially free of Be;
- b. adding calcium to the molten aluminum alloy; and
- c. casting the aluminum alloy into an ingot.

2. The method as claimed in claim 1 wherein the aluminum alloy comprises less than 0.2 wt. % Fe.

3. The method as claimed in claim 1 wherein from about 5 to 5,000 ppm calcium is added to the aluminum alloy.

4. The method as claimed in claim 1 wherein the aluminum alloy comprises up to about 0.25 % grain refiners.

5. The method as claimed in claim 4 wherein the grain refiners are selected from the group consisting of Ti, Zr, Sr, B, and C.

6. The method as claimed in claim 5 wherein the grain refiners are combinations selected from the group consisting of 3 % Ti - 1 % B, 3 % Ti - 0.15 % C, 5 % Ti - 1 % B and 5 % Ti - 0.2 % B.

7. The method as claimed in claim 1 wherein the casting is a casting method selected from the group consisting of direct chill casting, electromagnetic casting, horizontal direct chill casting, hot top casting, continuous casting, semi-continuous casting, die casting, roll casting and sand casting.

8. The method as claimed in claim 1 further comprising the step of working the ingot.

9. The method as claimed in claim 8 wherein the working step is one or more selected from the group consisting of hot rolling, cold rolling, extruding, forging, drawing, ironing, heat treating, aging, forming and stretching.

10. The method as claimed in claim 1 wherein the aluminum alloy is an alloy selected from the group consisting of Aluminum Association Registered Alloys 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx, 7xxx and 8xxx.

11. A method of improving the surface properties of cast aluminum alloys comprising the steps of:

- a. providing a molten aluminum alloy that is essentially free of Be;
- b. adding to the molten aluminum alloy about 250 to 1,500 ppm (0.0025 - 0.0150 wt. %) Ca and a grain refiner selected from the group consisting of 3 % Ti - 1 % B, 3 % Ti - 0.015 % C, 3 % Zr - 1 % B, and 3 % Zr - 1 % C; and
- c. casting the molten aluminum alloy to form an ingot.

12. The method of claim 11 wherein the aluminum alloy is one selected from the group consisting of Aluminum Association Registered Alloys 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx, 7xxx and 8xxx.

13. The method of claim 11 wherein the aluminum alloy is one of AA7050 or AA7055.

14. The method of claim 11 wherein the aluminum alloy is one of AA5083 or AA5182.

15. The method of claim 11 wherein about 8 to 15 ppm Ca is added to the melt and wherein a 3 % Ti - 0.15 % C grain refiner is used.

16. An aluminum alloy that contains essentially no Be and is comprised of from 5 to 1,000 ppm calcium and up to 0.25 % grain refiners.

17. The aluminum alloy as claimed in claim 16 further comprising less than 0.2 wt. % Fe.

18. The aluminum alloy as claimed in claim 16 further comprising additional alkaline earth metals, transition metals, rare earth metals and other elements sufficient to correspond to aluminum alloys selected from the group consisting of Aluminum Association Registered Alloys 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx, 7xxx and 8xxx.

19. The aluminum alloy as claimed in claim 16 wherein the grain refiners are selected from the group consisting of Ti, Zr, Sr, B, and C.

20. The aluminum alloy as claimed in claim 19 wherein the grain refiners is one or more selected from the group consisting of 3 % Ti - 1 % B, 5 % Ti - 1 % B, 5 % Ti - 0.2 % B and 3 % ~~Ti~~ - 0.15 % C.

21. An ingot cast from the aluminum alloy of claim 16.

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